Patent claims

1. Synthetic resin dispersions for the production of hydrophilic sheet-like structures or hydrophilic shaped articles provided with hydrophobic surfaces, **characterized in that** the synthetic resin dispersions comprise
   a) an aqueous phase of solutions of hydrophilic melamine resin precondensates and latent curing catalysts in water or in mixtures of water and C_1-C_6-alcohols and
   b) an organic nanophase in the form of nanodroplets and/or nanoparticles of 70 to 99 % by weight of water-insoluble etherified melamine resin precondensates which contain acid curing catalysts and hydrophobizing agents and
   c) dispersing agents in a concentration of 1 to 10 % by weight, based on the total weight of the melamine resin precondensates,

   the ratio of hydrophilic melamine resin precondensates to water-insoluble etherified melamine resin precondensates in the synthetic resin dispersions being 10:1 to 1:10 and the water content of the synthetic resin dispersions being 8 to 50 % by weight.

2. Synthetic resin dispersions according to Claim 1, **characterized in that** they comprise 0.1 to 5 % by weight of pigments and/or 0.1 to 5 % by weight of flameproofing agents, in each case based on the total weight of the melamine resin precondensates.

3. Synthetic resin dispersions according to Claim 1 or 2, **characterized in that** the melamine resin precondensates in the aqueous phase and in the organic phase are based on melamine and formaldehyde.

4. Synthetic resin dispersions according to at least one of the preceding claims, **characterized in that** the concentration of the curing catalysts is 0.05 to 3 % by weight, based on the melamine resin precondensates.

5. Synthetic resin dispersions according to at least one of the preceding claims, **characterized in that** the molar ratio of aldehyde component / melamine component in the hydrophilic melamine resin precondensates is 1.6 : 1 to 4.5 : 1 and the concentration of the hydrophilic melamine resin precondensates in the aqueous phase is 10 to 50 % by weight.

6. Synthetic resin dispersions according to at least one of the preceding claims, **characterized in that** the hydrophilic melamine resin precondensates are melamine resin precondensates partly etherified with C_1-C_4-alcohols and/or non-etherified melamine resin precondensates and in that the mixing ratio in the mixtures of water and C_1-C_6-alcohols is 95 : 5 to 5 : 95.

7. Synthetic resin dispersions according to Claim 6, **characterized in that** the content of hydroxyl groups which are not etherified with C_1-C_4-alcohols in the melamine resin precondensates partly etherified with C_1-C_4-alcohols is 5 to 75 mol%, based on the sum of hydroxyl groups and C_1-C_4-alkoxy groups in the melamine resin precondensates partly etherified with C_1-C_4-alcohols.

8. Synthetic resin dispersions according to at least one of the preceding claims, **characterized in that** the aqueous phase contains 1 to 20 by weight, based on the hydrophilic melamine resin precondensates, of further water-soluble polymers and/or water-soluble polyhydric alcohols with molecular weights of 62 to 5,000.

9. Synthetic resin dispersions according to at least one of the preceding claims, characterized in that the water-insoluble etherified melamine resin

precondensates are melamine resin precondensates completely etherified with C_1-C_4-alcohols, C_2-C_{20}-diols and/or polyalkylene oxides with molecular weights of 250 to 5,000 and/or melamine resin precondensates partly etherified with C_5-C_{18}-alcohols, C_2-C_{20}-diols and/or polyalkylene oxides with molecular weights of 250 to 5,000.

10. Synthetic resin dispersions according to at least one of the preceding claims, **characterized in that** the molar ratio of aldehyde component / melamine component in the water-insoluble etherified melamine resin precondensates is 3 : 1 to 6 : 1 and in that the average diameter of the nanodroplets or nanoparticles is 50 to 300 nm.

11. Synthetic resin dispersions according to at least one of the preceding claims, **characterized in that** the organic nanophase comprises 0.1 to 2 % by weight of stabilizers, 1 to 20 % by weight of water-insoluble polyhydric alcohols with molecular weights of 134 to 5,000 and/or 1 to 30 % by weight of laminar silicates, in each case based on the water-insoluble etherified melamine resin precondensates.

12. Synthetic resin dispersions according to at least one of the preceding claims, **characterized in that** the hydrophobizing agents are organic silicon compounds of the type of organosilanols, organosiloxanes, organosilanes, organoaminosilanes or polyorganosiloxanes terminated with amino end groups or hydroxyl end groups; surface-fluorinated SiO_2 nanoparticles, polytetrafluoroethylene nanoparticles and/or ethylenically unsaturated C_4-C_{20}-dicarboxylic acid anhydride copolymers containing imide groups.

13. Synthetic resin dispersions according to at least one of the preceding claims, **characterized in that** nonionic dispersing agents or mixtures of 50 to 99 % by weight of nonionic and 1 to 50 % by weight of anionic dispersing agents are employed as dispersing agents.

14. Synthetic resin dispersions according to at least one of Claims 1 to 12, **characterized in that** etherified melamine resin oligomers with molecular weights of 2,000 to 30,000 are employed as dispersing agents.

15. Synthetic resin dispersions according to Claim 14, **characterized in that** the etherified melamine resin oligomers are melamine resin oligomers etherified with polyethylene glycols with molecular weights of

1,000 to 8,000 and/or C1-C12-monoalkyl-etherified polyethylene glycols with molecular weights of 1,000 to 8,500 and C1-C10 alcohols.

16. Synthetic resin dispersions according to Claim 15, characterized in that the molar ratio of polyethylene glycol / C1-C10 alcohol is 1 : 10 to 2 : 1 and the molar ratio of melamine / formaldehyde / etherifying alcohol is 1 : 2.8 : 2.5 to 1 : 4.5 : 3.5.

17. Synthetic resin dispersions according to at least one of the preceding claims, **characterized in that** the hydrophilic sheet-like structures are laminates, pressed laminates or sheet-like carrier materials based on cellulose, preferably paper, wood, and/or polar plastics of the type of polyamide, polyester, polyvinyl acetate and/or polyvinyl alcohol.

18. Synthetic resin dispersions according to at least one of the preceding claims, **characterized in that** the hydrophilic shaped articles are timber products, or semi-finished products or moulded materials produced by thermoplastic processing of polar plastics of the type of polyamide, polyester, polyvinyl acetate and/or polyvinyl alcohol or by processing of blends of 55 to 90 % by weight of wood and 45 to 10 % by weight of thermoplastics and/or thermosetting plastics.

19. Synthetic resin dispersions according to at least one of the preceding claims, **characterized in that** the latent curing catalysts contained in the aqueous phase are ammonium salts, preferably preferably methylammonium phthalate, methylammonium maleate and/or the methylamine salt of naphthalenesulphonic acid, and/or esters of

phosphoric acid, phosphorous acid, oxalic acid and/or phthalic acid, preferably diethyl phosphate, oxalic acid dimethyl ester and/or phthalic acid dimethyl ester.

20. Synthetic resin dispersions according to at least one of the preceding claims, **characterized in that**
- at a molar ratio of aldehyde component/melamine component up to 4 : 1, blocked sulphonic acids, aliphatic C_4-C_{18}-carboxylic acids, alkali metal salts or ammonium salts of phosphoric acid, C_1-C_{12}-alkyl esters or C_2-C_8-hydroxyalkyl esters of C_6-C_{14}-aromatic carboxylic acids or inorganic acids, salts of melamine or guanamines with C_1-C_{18}-aliphatic carboxylic acids, anhydrides, half-esters or half-amides of C_4-C_{20}-dicarboxylic acids, half-esters or half-amides of copolymers of ethylenically unsaturated C_4-C_{20}-dicarboxylic acid anhydrides and ethylenically unsaturated monomers of the type of C_2-C_{20}-olefins and/or C_8-C_{20}-vinylaromatics, (meth)acrylic acid copolymers and/or salts of C_1-C_{12}-alkylamines or alkanolamines with C_1-C_{18}-aliphatic, C_6-C_{14}-aromatic or alkylaromatic carboxylic acids or inorganic acids of the type of hydrochloric acid, sulphuric acid or phosphoric acid, or
- at a molar ratio above 4 : 1, strong acids, preferably hydrochloric acid, sulphuric acid, phosphoric acid, p-toluenesulphonic acid, methanesulphonic acid, dodecylbenzenesulphonic acid, dinonylnaphthalenesulphonic acid and/or dinonylnaphthalenedisulphonic acid are employed as acid curing catalysts in the water-insoluble melamine resin precondensates.

21. Synthetic resin dispersions according to Claim 13, **characterized in that** the nonionic dispersing agents are ethylene oxide/propylene oxide block copolymers, poly(C_2-C_4-alkylene) oxides monoetherified with C_8-C_{18}-alcohols, esters of polyhydric alcohols with C_8- C_{18}-carboxylic acids, C_2-C_4-alkylene oxide adducts

on C_8-C_{18}-fatty alcohols and/or copolymers of ethylenically unsaturated C_4-C_{20}-dicarboxylic acid anhydrides and ethylenically unsaturated monomers of the type of C_2-C_{20}-olefins, C_8-C_{20}-vinylaromatics, C_4-C_{21}-acrylic acid esters and/or C_5-C_{22}-methacrylic acid esters, which have been imidized with poly(C_2-C_4-alkylene) oxides terminated by amino groups.

22. Synthetic resin dispersions according to Claim 13, **characterized in that** the anionic dispersing agents are alkali metal salts of (meth)acrylic acid copolymers, salts of oxyethylated C_6-C_{18}-alkylphenol-sulphates and/or alkali metal and/or ammonium salts of C_8-C_{18}-carboxylic acids and/or C_8-C_{18}-alkylsulphonates.

23. Process for the preparation of synthetic resin dispersions according to at least one of the preceding claims, **characterized in that** they are prepared by a multi-stage process in which
- in the first process stage mixtures of hydrophilic melamine resin precondensates, water-insoluble melamine resin precondensates and hydrophobizing agents are homogenized as highly viscous liquids or melts at 50 to 130°C over residence times of 2 to 15 minutes and
- in the second process stage the mixtures are introduced at high shear rates over residence times of 3 minutes to 15 minutes into 8.7 to 100 % by weight, based on the sum of the melamine resin precondensates, of water which contains 0.5 to 10 % by weight, based on the sum of the melamine resin precondensates, of dispersing agents and the dispersions are cooled to room temperature at low shear rates, with further stirring, latent curing agents and acid curing catalysts being added after the cooling to room temperature.

24. Process for the preparation of synthetic resin dispersions according to Claim 23, **characterized in that** the water in the second process stage contains 1 to 25 % by weight, based on the total weight of the melamine resin precondensates, of C_3-C_6-alcohols as dispersing auxiliaries and/or water-soluble polymers alcohols and is heated

to temperatures up to 90°C, and in that pigments and/or flameproofing agents are added after the cooling to room temperature.

25. Process for the preparation of synthetic resin dispersions according to at least one of Claims 1 to 22, **characterized in that** they are prepared by a multi-stage process in which

- in the first process stage water-insoluble melamine resin precondensates are introduced as highly viscous liquids or melts at 50 to 130°C at high shear rates over residence times of 3 minutes to 15 minutes into 8.7 to 100 % by weight, based on the water-insoluble melamine resin precondensates, of water which contains 0.5 to 10 % by weight, based on the water-insoluble melamine resin precondensates, of dispersing agents and the dispersions are cooled to room temperature at low shear rates, with further stirring, and
- in the second process stage hydrophilic melamine resin precondensates are added as solutions to the aqueous dispersion of the water-insoluble melamine resin precondensates and the mixture is homogenized, latent curing agents and acid curing catalysts being added to the aqueous solutions.

26. Process for the preparation of synthetic resin dispersions according to Claim 25, **characterized in that** the water-insoluble melamine resin precondensates in the first process stage and/or the aqueous solutions of the second process stage contain up to 30 % by weight of hydrophobizing agent and the water in the first process stage contains 1 to 25 % by weight, based on the water-insoluble melamine resin precondensates, of C_3-C_6-alcohols as dispersing auxiliaries and/or water-soluble polymers and/or water-soluble polyhydric alcohols and is heated to temperatures up to 90°C, and in that pigments and/or flameproofing agents are added to the aqueous solutions of the

second process stage.

27. Process for the preparation of synthetic resin dispersions according to at least one of Claims 1 to 22, **characterized in that** they are prepared by a multi-stage process in which

- in the first process stage melamine resins etherified with C1-C10-alcohols are reacted, in the presence or in the absence of acid curing catalysts, with polyethylene glycols with molecular weights of 500 to 8,000 at temperatures of 50 to 165°C to give etherified melamine resin oligomers,
- in the second process stage, at temperatures of 60 to 200°C, mixtures of 15 to 40 % by weight of etherified melamine resin oligomers and 85 to 60 % by weight of melamine resins etherified with C1-C10-alcohols and with molecular weights of 300 to 800 are introduced at a high shear gradient into water, which is preheated to 20 to 80°C, 0 to 8 % by weight of hydrophobizing agent being added to the melt of etherified melamine resin oligomers and melamine resins etherified with C1-C10-alcohols and/or the aqueous phase in the second process stage, after which
- in the third process stage 10 to 40 % by weight of hydrophilic melamine resin precondensates are mixed in the form of a 30 to 70 % strength aqueous solution with 90 to 60 % by weight of the mixture of melamine resin oligomers and etherified melamine resins of the second process stage.

28. Hydrophilic sheet-like structures or hydrophilic shaped articles provided with hydrophobic surfaces, produced using synthetic resin dispersions according to one or more of Claims 1 to 22.

29. Hydrophilic sheet-like structures or hydrophilic shaped articles provided with hydrophobic surfaces, according to Claim 28, **characterized in that** the thickness of the hydrophobic

surfaces is 1 to 40 µm.

30. Hydrophilic sheet-like structures or hydrophilic shaped articles provided with hydrophobic surfaces, according to Claim 28 or 29, **characterized in that** for production of the hydrophobic surfaces, the synthetic resin dispersions are applied to the hydrophilic sheet-like structures, excluding laminates, or hydrophilic shaped articles by spraying on after preheating of the hydrophilic sheet-like structures

or hydrophilic shaped articles to 50 to 95°C, and the sheet-like structures or shaped articles impregnated with the synthetic resin dispersions are dried and cured at 100 to 145°C.

31. Use of sheet-like structures or shaped articles coated with synthetic resin dispersions, according to one or more of Claims 28 to 30, for uses in the construction sector, in particular as cladding panels, and in the sport and leisure sector where an improved resistance to weathering and the ability to be glued are required.